

Hybrid G3-PLC/radio solutions and associated applications

Contact:

Dr. Jiazi Yi, Network Research Group, Ecole Polytechnique
jjazi.yi@polytechnique.edu

Context:

This project is based on the EDF-X-Renesas Synergy Student Challenge (for more details: <http://www.wsplc2016.fr/student-challenge/>). It is allowed to build a team of two students for this project.

G3-PLC (Power Line Communications) is a key technology for the “Smart Grid”. It uses electrical wiring to simultaneously carry both data and AC electric power transmission. It is now being tested and deployed in France for building the next generation of the distribution grid.

LoRa is a specification intended for wireless battery operated Things in regional, national or global network. LoRaWAN target key requirements of internet of things such as secure bi-directional communication, mobility and localization services. It is also a candidate for the smart grid technology.

Problem Statement:

The team is expected to develop application software for various use cases in the domain of smart grid (including but not limited to smart metering, smart city, smart home, electro-mobility, grid automation, renewable production...), using both G3-PLC and radio communications. For instance students may focus their work on the following technical topics of interest:

- G3-PLC/LoRa medium selection depending on various indicators such as signal to noise ratio, packet loss rate, RF duty cycle constraints etc.
- Development of a unified lower-layer network infrastructure for heterogeneous communicating devices (supporting PLC-only, RF-only or PLC+RF).
- Smart home demand response application over a hybrid telecommunication network.
- Renewable production control and monitoring.

Schedule:

If you are interested in the project, please:

- It is possible to build a team of two students.
- Check information of related technologies (smart grid, LoRa, G3-PLC, etc.) to have a general understanding of them.
- Contact Dr. Jiazi Yi to discuss the topic to be studied.
- Submit the application for the student challenge before September 23rd.

Because of the deadline and the time needed to form a proposal, the actions above MUST be performed *AS SOON AS POSSIBLE*.

- The team will be notified by September 30th on the results of the application. If the application is rejected, the members need to look for another topic.
- Once the application is accepted, there will be a training session on October 12th and 13th. Two platforms will be supplied, each one with:
 - * 1 Synergy starter kit SK-S7G2 supplied by Renesas Electronics Europe,
 - * 1 Cool Phoenix G3-PLC modem supplied by Renesas Electronics Europe,
 - * 1 LoRa modem supplied by Avnet Silica.
- In addition to the regular requirements of the ACN scientific project (mid-term report, short paper, defence, etc.), the team will be invited to present their work (in English language) in 30 min to

the student challenge jury within the last two weeks of March 2017 (dates to be announced subsequently).

References:

- Razazian, Kaveh, et al. "G3-PLC specification for powerline communication: Overview, system simulation and field trial results." Power Line Communications and Its Applications (ISPLC), 2010 IEEE International Symposium on. IEEE, 2010.
- Augustin, Aloys; Yi, Jiazi; Clausen, Thomas; Townsley, Mark: A Study of LoRa: Long Range & Low Power Networks for the Internet of Things, August 2016, Sensors.